

What is claimed is:

- 1 1. A multi-user detector comprising:  
2 a channel estimator to estimate actual channel taps associated with users of  
3 interest based on a receive signal; and  
4 a channel tap interpolator to generate interpolated channel taps for a first user of  
5 interest when at least one actual channel tap associated with said first user of interest  
6 occurs at a non-integer multiple of a chip period from a sampling reference point, said  
7 interpolated channel taps occurring at integer multiples of the chip period from the  
8 sampling reference point.
- 1 2. The multi-user detector of claim 1, wherein:  
2 said channel tap interpolator generates a set of interpolated channel taps for  
3 each actual channel tap associated with said users of interest that occurs at a non-  
4 integer multiple of a chip period from the sampling reference point.
- 1 3. The multi-user detector of claim 1, comprising:  
2 a virtual user definition unit to define a plurality of low dimensionality virtual  
3 users based on a recursive property of spreading sequences associated with said users  
4 of interest, each low dimensionality virtual user having a number of associated  
5 subsymbols within a corresponding symbol period.
- 1 4. The multi-user detector of claim 3, comprising:  
2 a spreading sequence interpolator to generate interpolated spreading sequences  
3 for low dimensionality virtual users based on interpolated channel taps.
- 1 5. The multi-user detector of claim 4, comprising:  
2 an MMSE unit to generate individual de-spreading sequences corresponding to  
3 subsymbols of at least one virtual user of interest.

1 6. The multi-user detector of claim 5, comprising:  
2 a combination unit to generate a de-spreading sequence for an actual user by  
3 combining individual de-spreading sequences generated by said MMSE unit.

1 7. The multi-user detector of claim 1, wherein:  
2 said channel tap interpolator includes an interpolation filter.

1 8. The multi-user detector of claim 1, wherein:  
2 said channel estimator estimates actual channel taps for at least one base station  
3 of interest, said at least one base station of interest being associated with at least one  
4 user of interest.

1 9. A method for use in generating a de-spreading sequence for a desired user  
2 within a CDMA receiver, comprising:  
3 estimating actual channel taps for users of interest based on a receive signal that  
4 includes code modulated signal components for multiple users, said code modulated  
5 signal components having overlapping frequency spectrums; and  
6 generating interpolated channel taps for a user of interest when at least one  
7 actual channel tap associated with the user of interest occurs at a non-integer multiple  
8 of a chip period from a sampling reference point, said interpolated channel taps  
9 occurring at integer multiples of said chip period from said sampling reference point.

1 10. The method of claim 9, wherein:  
2 estimating actual channel taps for users of interest includes estimating actual  
3 channel taps for at least one base station of interest, said at least one base station of  
4 interest being associated with at least one user of interest.

1 11. The method of claim 9, wherein:  
2 generating interpolated channel taps includes using an interpolation filter.

1 12. The method of claim 9, wherein:  
 2 generating interpolated channel taps includes generating a set of interpolated  
 3 channel taps for each actual channel tap associated with said users of interest that  
 4 occurs at a non-integer multiple of a chip period from the sampling reference point.

1 13. The method of claim 9, further comprising:  
 2 defining a plurality of low dimensionality virtual users based on a recursive  
 3 property of spreading sequences associated with said users of interest, each low  
 4 dimensionality virtual user having a number of associated subsymbols within a  
 5 corresponding symbol period.

1 14. The method of claim 13, further comprising:  
 2 generating interpolated spreading sequences for virtual users based on said  
 3 interpolated channel taps.

1 15. The method of claim 14, further comprising:  
 2 generating individual de-spreading sequences for subsymbols associated with at  
 3 least one virtual user of interest using said interpolated spreading sequences.

1 16. The method of claim 15, wherein:  
 2 generating individual de-spreading sequences includes using MMSE techniques.

1 17. The method of claim 15, further comprising:  
 2 combining individual de-spreading sequences associated with said at least one  
 3 virtual user of interest to generate a de-spreading sequence for the desired user.

1 18. A receiver system for use in a CDMA-based communication system,  
 2 comprising:

3 a de-spreader to de-spread a receive signal using a de-spreading sequence  
4 associated with a desired user, said receive signal including code modulated signal  
5 components for multiple users that have overlapping signal spectrums; and  
6 a de-spreading sequence determination unit to generate said de-spreading  
7 sequence, said de-spreading sequence determination unit including a channel tap  
8 interpolator to determine interpolated channel taps for a user of interest when at least  
9 one actual channel tap associated with the user of interest occurs at a non-integer  
10 multiple of a chip period from a sampling reference point, wherein said interpolated  
11 channel taps occur at integer multiples of said chip period from the sampling reference.

1 19. The receiver system of claim 18 wherein:  
2 said channel tap interpolator includes an interpolation filter.

1 20. The receiver system of claim 18 wherein:  
2 said de-spreading sequence determination unit further comprises a virtual user  
3 definition unit to define low dimensionality virtual users based on a recursive property  
4 of spreading sequences of said users of interest, said low dimensionality virtual users  
5 each having multiple subsymbols within a corresponding symbol period.

1 21. The receiver system of claim 20 wherein:  
2 said de-spreading sequence determination unit further comprises a spreading  
3 sequence interpolator to generate interpolated spreading sequences for low  
4 dimensionality virtual users based on interpolated channel taps.

1 22. The receiver system of claim 21 wherein:  
2 said de-spreading sequence determination unit further comprises an MMSE unit  
3 to generate individual de-spreading sequences for subsymbols of at least one virtual  
4 user of interest.

1 23. The receiver system of claim 22 wherein:  
 2 said de-spreading sequence determination unit further comprises a combination  
 3 unit to combine individual de-spreading sequences generated by said MMSE unit to  
 4 generate said de-spreading sequence for said desired user.

1 24. The receiver system of claim 18 wherein:  
 2 said receiver system is located within a handheld communicator.

1 25. The receiver system of claim 18 wherein:  
 2 said receiver system is located within a cellular base station.

1 26. An article comprising machine-accessible media having associated data,  
 2 wherein the data, when accessed, results in a machine for performing a method of  
 3 generating a de-spreading sequence for a desired user in a CDMA system, said method  
 4 comprising:  
 5 estimating actual channel taps for users of interest based on a receive signal that  
 6 includes code modulated signal components for multiple users, said code modulated  
 7 signal components having overlapping signal spectrums; and  
 8 generating interpolated channel taps for a user of interest when at least one  
 9 actual channel tap associated with the user of interest occurs at a non-integer multiple  
 10 of a chip period from a sampling reference point, said interpolated channel taps  
 11 occurring at integer multiples of said chip period from said sampling reference point.

1 27. The article of claim 26 wherein:  
 2 generating interpolated channel taps includes generating interpolated channel  
 3 taps for each user of interest having at least one actual channel tap that occurs at a non-  
 4 integer multiple of a chip period from the sampling reference point.

1 28. The article of claim 27 wherein said method further comprises:  
2 defining a plurality of low dimensionality virtual users based on a recursive  
3 property of spreading sequences associated with said users of interest, each low  
4 dimensionality virtual user having a number of associated subsymbols within a  
5 corresponding symbol period.

1 29. The article of claim 28 wherein said method further comprises:  
2 generating interpolated spreading sequences for low dimensionality virtual users  
3 based on said interpolated channel taps.

1 30. The article of claim 29 wherein said method further comprises:  
2 generating individual de-spreading sequences for subsymbols associated with at  
3 least one low dimensionality virtual user of interest using said interpolated spreading  
4 sequences.

1 31. The article of claim 30 wherein said method further comprises:  
2 combining individual de-spreading sequences associated with said at least one  
3 low dimensionality virtual user of interest to generate a de-spreading sequence for the  
4 desired user.